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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/826,558	04/16/2004	Vladimir Lifshits	002139-013510US	2112

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EXAMINER

CHUO, TONY SHENG HSIANG

ART UNIT PAPER NUMBER

1745

DATE MAILED: 07/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/826,558	LIFSHITS, VLADIMIR	
	<b>Examiner</b>	<b>Art Unit</b>	
	Tony Chuo	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 16 April 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) 13-19 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 April 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

**DETAILED ACTION**

***Election/Restrictions***

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
  - I. Claims 1-12, drawn to a method of operating a fuel cell, classified in class 429, subclass 13.
  - II. Claims 13-19, drawn to a fuel cell apparatus, classified in class 429, subclass 19.

The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another and materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case, the process as claimed can be practiced by another and materially different apparatus or by hand. The method of operating a fuel cell does not require a first burner for heating the oxygen and a second burner for heating the effluent.

Because these inventions are independent or distinct for the reasons given above and have acquired a separate status in the art in view of their different classification, restriction for examination purposes as indicated is proper.

Because these inventions are independent or distinct for the reasons given above and the inventions require a different field of search (see MPEP § 808.02), restriction for examination purposes as indicated is proper.

During a telephone conversation with Mr. George Seka on 7/18/06, a provisional election was made with traverse to prosecute the invention of Group I, claims 1-12. Affirmation of this election must be made by applicant in replying to this Office action. Claims 13-19 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

### ***Priority***

2. Priority is granted for provisional application no. 60/464,220 for claims 1-11. However, priority is not granted for provisional application no. 60/464,220 for claim 12. Provisional application no. 60/464,220 does not provide adequate written support for the subject matter, "heating is performed intermittently", in claim 12.

### ***Drawings***

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: controller "60" on page 7. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be

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notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Specification***

4. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: The subject matter of claim 12 is not disclosed in the specification.

***Claim Rejections - 35 USC § 112***

5. Claim 1 recites the limitation "combustible components" in line 5. There is insufficient antecedent basis for this limitation in the claim.

6. Claim 1 recites the limitation "combustible materials" in line 6. There is insufficient antecedent basis for this limitation in the claim.

7. Claim 6 recites the limitation "heating the anode gas" in line 2. There is insufficient antecedent basis for this limitation in the claim. Claim 1 recites heating the oxygen and heating the effluent.

***Claim Rejections - 35 USC § 102***

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent

granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

9. Claims 1, 2, 6, and 7 are rejected under 35 U.S.C. 102(e) as being anticipated by Ballantine et al (US 6740437). Regarding claim 1, the Ballantine reference teaches a method of operating a fuel cell comprising: exhausting fuel gas at an elevated temperature from the fuel cell to an oxidizer "318" that receives oxygen "314" via conduit "320" from the fuel cell stack to form an oxidizable anode gas mixture; heating the air by the heat generated by the fuel cell to a temperature at which the combustible components can be catalytically oxidized; catalytically oxidizing the mixture in the oxidizer "318" to form an effluent; heating the effluent by adding a supplemental supply of oxygen to oxidize combustibles which would increase the temperature of the effluent during portions of time when the fuel cell is generating electricity; and heating the fuel cell with the effluent by feeding the effluent to a heat exchange which transfers heat back to the fuel cell by humidifying the air stream that is fed to the fuel cell (See Figure 3, column 10, lines 1-12 and 26 to 35). Examiner's note: Ballantine et al discloses maintaining the temperature of the oxidizer at a temperature over 600°C (See column 12 lines 48-50). This implies that additional heat is added to the oxidizer to heat the air when the temperature drops below a temperature at which the combustible components can be catalytically oxidized. Further, the phrase "when a temperature of the mixture drops below a temperature at which the combustible components can be catalytically oxidized" is a conditional statement. Therefore, if the temperature of the oxidizer does not drop below a temperature at which the combustible components can be catalytically

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oxidized, as during steady state conditions, then the oxygen will not need to be further heated to a temperature at which combustible components can be catalytically oxidized.

Regarding claim 2, it also teaches a method of operating a fuel cell comprising generating an air flow, heating the air flow by the heat generated by the fuel cell, and mixing the air flow with the anode gas to form a mixture (See column 10, lines 1-10).

Regarding claim 6, it also teaches a method of operating a fuel cell comprising adding a supplemental supply of oxygen to ensure adequate oxygen to oxidize combustibles in the fuel exhaust (See column 10, lines 7-10). By doing so, the heat output that is generated by the oxidizer to heat the anode gas is modulated to compensate for variations in the proportion of combustible components in the anode gas.

Regarding claim 7, it also teaches method of operating a fuel cell comprising independently modulating the heat output during heating the oxygen and a heat output generated for heating the effluent by modulating the heat output of the fuel cell that is used to heat the oxygen independently from the supplemental supply of oxygen that is used to heat the oxidizer effluent (See column 9 lines 65-67 and column 10 lines 8-10).

### ***Claim Rejections - 35 USC § 103***

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 3-5 and 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ballantine et al (US 6740437) in view of Haltiner, Jr. et al (US 6967064). The Ballantine reference is applied to claims 1, 2, 6, and 7 for reasons stated above.

However, the reference does not expressly teach exchanging heat between the air flow and anode gas prior to mixing the air flow with the anode gas wherein exchanging heat comprises forming a first and second flow path for the anode gas and the air flow and separating the flow paths by a heat exchange medium to transfer heat between the anode gas and the air flow so that the temperatures of the anode gas and the air flow become more equal, and thereafter merging the anode gas and air flow to form a mixture, and selecting a length of the flow paths so that substantially no portions of the mixture are above an auto-ignition temperature of the combustible components in the anode gas at a predetermined highest temperature of the anode gas encountered during the operation of the fuel cell. The Haltiner, Jr. reference teaches exchanging heat between the reformat which is the anode gas and the air flow in a co-flow heat exchanger "124" comprising a sinusoidal tube "138" for conveying the reformat and a chamber which air passes through (See column 4 line 64 to column 5 line 9).

Examiner's note: It is implicit from the teaching of Haltiner, Jr. et al that the length of the flow paths would be long enough so that no portions of the mixture would be above the auto ignition temperature of the combustible components in the anode gas in order for combustible components to be catalytically oxidized inside the oxidizer instead of inside the flow paths. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Ballantine method of operating a fuel



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cell to include exchanging heat between the anode gas and the air flow by using a heat exchanger before the oxidizer comprising a first and second flow path for the anode gas and the air flow and separating the flow paths by a heat exchange medium to transfer heat between the anode gas and the air flow so that the temperatures of the anode gas and the air flow become more equal and thereafter merging the anode gas and air flow to form a mixture, and selecting a length of the flow paths so that substantially no portions of the mixture are above an auto-ignition temperature of the combustible components in the anode gas at a predetermined highest temperature of the anode gas encountered during the operation of the fuel cell in order to maintain proper operation of the oxidizer by allowing the temperatures of the anode gas and air flow to become more equal.

12. Claims 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ballantine et al (US 6740437) in view of Nakanishi et al (JP 07-326379). The Ballantine reference is applied to claim 1 for reasons stated above. However, the reference does not expressly teach buffering the anode gas prior to adding oxygen to compensate for fluctuations in the proportion of the combustible components of the anode gas. The Nakanishi reference teaches buffering the anode exhaust gas by buffer layer "7" before it is exhausted to the outside of the fuel cell (See Abstract). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Ballantine method of operating a fuel cell to include buffering the anode gas prior to adding oxygen to compensate for fluctuations in the proportion of the

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combustible components of the anode gas in order to reduce the temperature difference between the cells which would reduce the degradation of the cells.

13. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ballantine et al (US 6740437) in view of Haltiner, Jr. et al (US 6967064) as applied to claims 9-10 above, and further in view of Kato et al (JP 2002-151115). However, the references do not expressly teach heating that is performed intermittently. The Kato reference teaches intermittently supplying hydrogen to the fuel cell (See Abstract).

Examiner's note: As a result of intermittently supplying hydrogen to the fuel cell, the air flow from the Ballantine fuel cell system would be intermittently be heated by the fuel cell. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Ballantine method of operating a fuel cell to include heating the air flow intermittently in order to reduce the amount of unreacted hydrogen exhausted from the fuel cell and increase the overall efficiency of the fuel cell system.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Dean et al (US 6370878) teaches using a electric heater which heats the oxygen to a minimum reaction temperature where the oxidation reaction occurs (See column 8, lines 14-18). Peschke et al (US 6551733) teaches supplying more air to oxidize the anode exhaust in order to yield more of the heating value of the

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anode exhaust and result in a higher temperature of the anode tail gas oxidizer unit  
(See column 4 lines 7-27).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tony Chuo whose telephone number is (571) 272-0717. The examiner can normally be reached on M-F, 8:30AM to 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

TC



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PRIMARY EXAMINER